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September 5, 2018

VIA ELECTRONIC FILING

Marlene H. Dortch, Secretary
Federal Communications Commission
445 12th Street, S.W.
Washington, D.C. 20554

Re: Written *Ex Parte* Letter
Streamlining Procedures for Small Satellites
IB Docket No. 18-86

Dear Ms. Dortch:

The Boeing Company ("Boeing"), through its counsel, files this *ex parte* letter to address certain issues that have been raised in the context of the Commission's rulemaking proceeding on the licensing of small satellites, which may also have relevance to other proceedings involving satellites and other communications services.

Small Satellite Operations in the 137-138 MHz Band. The Notice of Proposed Rulemaking ("*NPRM*") sought comment on the possibility of authorizing small satellites to operate in, *inter alia*, the 137-138 MHz band.[1] As the *NPRM* acknowledges, the 137-138 MHz band was one of the frequency segments allocated to non-voice, non-geostationary ("NVNG") satellite service.[2] Boeing agrees that small satellites could operate in portions of the 137-138 MHz band as long as they coordinate their operations with NVNG licensees or avoid those portions of the band that are used by the one existing NVNG network.

In its comments, Aviation Spectrum Resources, Inc. ("ASRI") raises concern about the possibility of harmful interference into datalink services operating near the band edge below 137 MHz to support both Air Traffic Control ("ATC") and Airline Operational Control ("AOC") safety-of-life communications.[3] This same concern was identified by the Commission in its

[1] *NPRM*, ¶ 66-67.

[2] *See id.*, ¶ 64.

[3] *See* Comments of Aviation Spectrum Resources, Inc., IB Docket No. 18-86, at 1-33 (July 9, 2018).

rulemaking proceeding that adopted rules for NVNG networks.[4] Based on technical studies of the issue, the Commission concluded that NVNG licensees should take such measures as limiting their use of the 137-137.025 MHz portion of the band to feeder links.[5] Absent further technical studies, Boeing believes that additional precautions may be needed to ensure that small satellites adequately protect ATC and AOC communications operating immediately below 137 MHz, such as refraining from authorizing the use of the 137-137.025 MHz portion of the band for small satellite communications.

Satellite-to-Satellite Communications. Boeing supports innovative proposals for satellite services that include communications links between satellites in relatively low Earth orbit and satellites in higher orbits, such as in geostationary ("GSO") orbit. Such communications can greatly increase the efficiency of medium Earth orbit ("MEO") and low Earth orbit ("LEO") satellite systems by providing an always-available communications link to Earth via a higher orbit satellite system.

The Commission's *NPRM* appears to welcome such innovative proposals, acknowledging that "the definition of FSS states that in some cases FSS may include satellite-to-satellite links, which may also be operated in the inter-satellite service"[6] and "[t]he definition of MSS likewise includes radiocommunication service 'between space stations used by this service.'"[7]

The flexibility that is acknowledged by the *NPRM*, however, appears to be withdrawn in subsequent sentences of the *NPRM*. First, the *NPRM* observes that "[f]or service allocations in some frequency bands" an FSS or MSS allocation "may be limited" by a parenthetical specifying a direction of operations, such as space-to-Earth or Earth-to-space.[8] Citing to 5.49 of the ITU Radio Regulations, the *NPRM* asserts that in such instances, inter-satellite communications would not be in accordance with the Table of Allocations.[9] Instead, the *NPRM* asserts, inter-satellite

[4] *See* Amendment of Part 25 of the Commission's Rules to Establish Rules and Policies Pertaining to the Second Processing Round of the Non-Voice, Non-Geostationary Mobile Satellite Service, IB Docket No. 96-220, *Report and Order*, FCC 97-370, ¶ 76 (Oct. 15, 1997).

[5] *See id.*

[6] *Id.*, ¶ 70 (*citing* 47 CFR § 25.103).

[7] *Id.* (*quoting* 47 CFR § 25.103).

[8] *Id.*

[9] ITU Radio Regulation No. 5.49 ("In the case where there is a parenthetical addition to an allocation in the Table, that service allocation is restricted to the type of operation so indicated.")

communications are only permitted where a parenthetical to an allocation specifies "space-to-space" communications.[10]

What the *NPRM* disregards in these assertions is the fact that *every* FSS and MSS allocation in the ITU Table of Allocations includes a parenthetical identifying a direction of operations (or, in a few cases, specifying both directions). Further, there are *no* FSS or MSS allocations in the ITU Table of Allocations that includes a space-to-space parenthetical.[11] Therefore, the *NPRM* appears to assert that satellite-to-satellite communications can never be undertaken in any of the existing FSS or MSS allocations, despite the *NPRM*'s acknowledgement that the definition of FSS and MSS note the permissibility of such communications. Boeing therefore suggests that the Commission reconsider its tentative conclusions regarding whether parentheticals that specify a specific direction actually prohibit satellite-to-satellite communications in that direction.[12]

As ViaSat observes in its reply comments, "such parentheticals are properly understood to refer to the *direction* of permissible communications" not the ultimate destination.[13] Thus, even though satellite communications with aircraft in-flight do not originate or terminate on the Earth, the ITU has clarified in certain circumstances that "Earth-to-space" communications are permitted "except aeronautical mobile-satellite."[14] No such limitation would be needed if Earth-to-space communications were required to originate from the surface of the Earth.

SES and O3b raise concern that uplink "transmissions from LEO at 400 km or MEO at 8000 km would imply higher signal strength at satellite receivers at GSO or at any NGSO higher than a smallsat inter-satellite transmission."[15] It is unclear whether SES/O3b's concern is limited to uplink transmissions from small satellites, or from any LEO or MEO satellite. In any event, such

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[10] *NPRM*, ¶ 70.

[11] The ITU Radio Regulations employ (space-to-space) parentheticals only for such services as Space Research, Space Operation, Earth Exploration-Satellite and Radionavigation-Satellite.

[12] *See, e.g.*, Comments of Inmarsat Inc., IB Docket No. 18-86, at 3 (July 9, 2018) (observing that "for inter-satellite links between a NGSO satellite and a GSO satellite, Inmarsat is of the view that transmissions from a NGSO satellite to a GSO satellite should only occur in the band allocated to MSS (Earth-to-space) and, conversely, transmissions from a GSO satellite to a NGSO satellite should only occur in the band allocated for MSS (space-to-Earth)). Although Inmarsat suggests there may be a need for the addition of a "space-to-space" parenthetical for such allocations, Inmarsat concedes that such an addition is not necessary.

[13] Reply Comments of Viasat, Inc., IB Docket No. 18-86, at 3 (Aug. 7, 2018).

[14] ITU Radio Regulations, No. 5.420 (explaining that "the band 2 655-2 670 MHz may also be used for the mobile-satellite (Earth-to-space), except aeronautical mobile-satellite, service for operation limited to within national boundaries").

[15] Reply Comments of SES Americon, Inc. and O3b Limited, IB Docket No. 18-86, at 9 (Aug. 9, 2018).

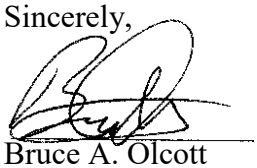
concern can be addressed fully through the use of power control and comparable means, just as it is used by earth stations on the ground to address rain fade and other sources of attenuation.

Audacy also expresses a rather alarmist concern that "[o]perational or approved GSO and NGSO systems, which represent billions of dollars in already sunk investment, were not designed or intended to coordinate their space-to-ground communications against fast moving small satellites transmitting to other satellites in space."[16] In reality, a LEO or MEO satellite communicating to a GSO spacecraft while operating within the nominal coverage "disk" of the GSO space station (*i.e.*, within 8.2 degrees of the GSO "relay" sub-satellite nadir point for an equivalent to 20-degree elevation angle as viewed from the ground) would be able to do so using the same earth station pointing and off axis transmission requirements that exist for earth stations at fixed locations or on mobile platforms. Thus, if operated pursuant to these parameters, no additional interference would be received by adjacent GSO satellites. Therefore, Audacy's concern is unwarranted and somewhat in conflict with its stated business plans to provide inter-satellite communications for other NGSO constellations.

Given these facts, the Commission should welcome proposals to operate communications links between lower orbit and higher orbit satellite systems in a manner consistent with the direction of transmissions specified in the Table of Frequency Allocations. At the very least, the Commission should not reach any decisions in this proceeding that could preclude such operations by satellite systems authorized pursuant the existing Part 25 licensing procedures.

Thank you for your attention to this matter. Please contact the undersigned if you have any questions.

Sincerely,



Bruce A. Olcott
Counsel to The Boeing Company

[16] Reply Comments of Audacy Corporation, IB Docket No. 18-86, at 8 (Aug. 7, 2018).